ISCHIO-FEMORAL ARTHRODESIS OF THE HIP IN TUBERCULOSIS

An Anterior Approach

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The operation to be described here is a modification of the ischio-femoral arthrodesis described by Brittain (1942). It is performed through an anterior incision, deepened so as to expose the upper part of the shaft of the femur and the ischium. Iliac bone grafts are inserted under direct vision. The evolution of this method of fusing the hip for tuberculous arthritis will be described briefly. At the outset it must be made clear that the writer does not advocate arthrodesis for tuberculous disease until the patient has acquired an adequate resistance to the disease, nor before there is evidence of healing in the joint. Five years ago we employed the methods of ilio-femoral arthrodesis described by Girdlestone (1940) and others. This operation gave good immediate results when there was no gross destruction of the head of the femur or of the acetabulum. But sound fusion did not occur in less than six to nine months, and observation of these patients over three or four years revealed a marked tendency to adduction of the femur. Moreover the ilio-femoral operation seemed unsuitable for patients in whom there was gross erosion of the head of the femur and of the acetabulum, with upward subluxation of the head. For these reasons we turned our attention to Brittain's (1942, 1948) ischio-femoral arthrodesis with a tibial graft. It gave improved results in cases in which there was marked destruction of the joint, and we have not observed subsequent adduction deformity of the hip. Nevertheless in several cases the graft slipped out of position or the lower fragment of the femur slipped outwards. Though we never encountered post-operative sciatic paralysis, in one operation on a cadaver we found that the graft was only one-quarter of an inch anterior to the sciatic nerve. Fusion was never sound in less than six months, and immobilisation for twelve months was often necessary.
In an attempt to overcome those disadvantages we considered the possibility of using cancellous grafts from the ilium, and of inserting the grafts through an anterior incision. We so aimed to combine the mechanical principles of Brittain with the physiological advantages of cancellous chip grafts described by Mowlem (1944). The operation is technically easier than the previous methods we used; and the graft cannot slip from position. In most cases fusion has occurred within three to four months. In a few cases in which healing of the tuberculous disease was sound, ischio-femoral grafting was combined with intra-articular arthrodesis. In other cases, in which the response to rest and immobilisation was poor, osteotomy of the femur just above the lesser trochanter was performed, and was followed after an interval of months by ischio-femoral grafting.

Radiographs illustrating three cases are reproduced in Figures 1 to 8.
Case 3. Tuberculous arthritis of the left hip joint. Figure 6 shows condition of the hip on admission to hospital. Despite immobilisation the general condition of the patient deteriorated. Osteotomy immediately above the lesser trochanter was followed by general and local improvement (Fig. 7). Ischio-femoral arthrodesis was undertaken six months after the osteotomy; radiographs three and a half months later show a solid mass of new bone (Fig. 8.) Clinically the joint was fused.

**TECHNIQUE OF OPERATION**

The operation is performed under a general anaesthetic, and a drip transfusion of blood is given throughout. The patient is placed on an orthopaedic table. The anterior incision described by Smith-Petersen (1940) is used, and the muscles are stripped from the outer and inner aspects of the anterior half of the iliac crest. The lower part of the incision follows the outer border of the sartorius muscle and extends to the junction of the upper and middle thirds of the thigh. The deep fascia is incised along the outer border of the sartorius. The origin of sartorius from the anterior-superior spine is divided close to bone, and the muscle is retracted medially to expose the rectus femoris and the fatty line of demarcation between the rectus femoris and iliopsoas (Fig. 9). This interval is developed and the medial border of the rectus femoris is defined (Fig. 10). Numerous branches of the lateral femoral
circumflex vessels are found: they are divided between haemostats and ligated as they are encountered. The heads of origin of rectus are divided close to bone and the muscle is retracted laterally to expose the capsule of the hip joint. A small lever is passed to define the inferior aspect of the joint (Fig. 11).

![Fig. 9](image1.png)

Anterior incision. The muscles have been stripped from both aspects of the anterior part of the ilium. Sartorius retracted, exposing rectus femoris.

![Fig. 10](image2.png)

The interval between rectus femoris and iliopsoas is developed. Branches of the lateral femoral circumflex vessels are ligated.

![Fig. 11](image3.png)

A bone lever is placed below the hip joint; iliopsoas is retracted medially, and rectus femoris laterally. This allows the inferior aspect of the joint to be defined.

![Fig. 12](image4.png)

A lever is pushed through the obturator externus into the lower part of the obturator foramen and retracts the sartorius, iliopsoas, pectineus and adductor magnus medially.

The iliopsoas muscle is reflected from the pubic ramus and from the medial part of the joint capsule and its insertion into the lesser trochanter is defined. A small lever is passed medial to the tendon, which is divided close to its insertion. This step is sometimes made easier by external rotation of the hip to bring the lesser trochanter forwards. The iliopsoas can now be retracted farther medially; and just distal and posterior to the lesser trochanter the fibres of insertion of pectineus and of adductor magnus are separated from the femur for one to one and a half inches.

The obturator externus muscle comes into view deep in the wound, between the capsule of the hip joint above and the pectineus and adductor magnus muscles below. A large bone lever is passed through the fibres of obturator externus on to the ischium and pushed medially until the obturator foramen is encountered. The lever is manipulated into the foramen so that its tip lies behind the ramus of the ischium; its handle is drawn medially to retract the sartorius, iliopsoas, pectineus and adductor magnus (Fig. 12). This manoeuvre opens up the
space between the lesser trochanter and the obturator foramen, and the mechanical leverage is such that retraction can be maintained with least effort by the assistant. A box retractor is passed obliquely medially and posteriorly. It lies between the rectus femoris and the lesser trochanter on the lateral side and the iliopsoas on the medial side.

The retractor has four sides, each tapering from a width of one and a half inches at the top to one and a quarter inches at the bottom. Each side is one and a half inches deep. The use of such a retractor greatly facilitates the exposure of the obturator externus in the depths of the wound. The part of the muscle that overlies the ischium is removed piecemeal with scissors or scalpel until the ischium comes into view (Fig. 13). The bone is rawed widely with a chisel under direct vision, the chisel passing through the box retractor. The ischium is then divided, using chisel and mallet. Sometimes this is easier through the box retractor, sometimes division of the bone is easier after removing the retractor. If the ischium is divided at the level of the obturator foramen (the level advised when the lower margin of the acetabulum is diseased), the whole width of the ramus must be divided. When the line of division is above the foramen the chisel should pass deeply into the bone (one to one and a half inches in adults).

In the next step the upper parts of the origins of the three vasti muscles are stripped.
from the femur and retracted laterally by a large bone lever passed round the bone. This exposes the antero-lateral aspect of the femur at the level of the lesser trochanter (Fig. 14). A drill hole is made through the femur with a motor drill, directed inwards and backwards towards the ischium (Fig. 15). The size of the hole should be rather less than half the diameter of the femur. If necessary the hole may be enlarged medially with a gouge.

A whole thickness graft is cut from the iliac crest. It measures one to one and a quarter inches in width and three and a half to four inches in length. Owing to the shape of the crest the graft is slightly curved and the posterior end slightly pointed. The wide flat end of the graft is held with sequestrum forceps and placed firmly in the cleft in the ischium. It is important that a firm fit be obtained, and it may be necessary to taper the end of the graft or to enlarge the cleft to a slight extent. At this stage the outer pointed end of the graft lies anterior to the lesser trochanter. The whole limb is now abducted and the outer end of the graft swung backwards until its pointed extremity lies opposite the hole in the femur. The limb is then adducted until the graft fits firmly in the hole in the femur (Fig. 16). Some slight adjustment of the graft or aperture may be necessary in order to obtain a firm fit with the hip joint in the neutral position. After fitting the graft the neck of the femur is rawed by making small cuts with chisel or gouge from below the lesser trochanter to the lower margin of the acetabulum. Small chips are cut from the ilium and packed between the femoral neck and the graft, and also between femur and ischium below the graft. The aim should be to fill in with grafts the space lying below the femoral neck and the acetabular margin, between the femur on the outer and ischium on the inner side. Where the femoral neck and acetabular margin are involved in the disease process it is sometimes wise not to pack the space above the main graft but to concentrate on forming a strong bar of bone at the lower level.

The wound is closed and a double hip spica plaster is applied with the affected hip in the neutral position and the sound hip slightly abducted.

**POST-OPERATIVE TREATMENT**

Three months after the operation the plaster is removed for clinical and radiographic tests of fusion of the hip. If the hip is firmly fused, and provided the sedimentation rate is below 25 millimetres in the first hour, the patient is allowed to walk in a double hip spica. After a further three months the plaster is discarded and the patient is allowed to go home. But he must be kept under careful supervision, and must return for routine examination every three months for at least a year, and thereafter at less frequent intervals.

**SUMMARY**

1. The anatomical and physiological principles underlying the operation of ischio-femoral arthrodesis by an anterior approach are discussed.
2. The technique of the operation is described.

The writer wishes to express his thanks to the Director of Medical Services, Kenya, for permission to publish this article, and to Mr G. Hermges for taking the coloured photographs.

**REFERENCES**


